Contribution ID: **4** Type: **not specified**

Dark matter in the Lorentz gauge theory

Monday 14 April 2025 11:30 (30 minutes)

The Lorentz gauge theory of gravity with a spontaneous symmetry breaking field, sometimes dubbed ”khronon”, provides a successful description of the ΛCDM model in which the dark matter candidate arises as a geometric effect. A chiral formulation of this theory has been found to be an extension of General Relativity, and this theory is being studied in phenomenological contexts of black holes and cosmology. While cosmological study supports that this model aligns with how ideal dust would behave, problems arise when formulating their interaction with black holes, as the khronon gauge only allows synchronous frame and an alternative gauge leads to the mimetic black hole solution. This talk presents how dark matter is formulated in this theory and discusses recently developed phenomenological results, including generalised black hole solutions and cosmological perturbation.

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